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ORIGINAL ARTICLES.

ON THE PRACTICAL EXECUTION OF OPHTHALMIC PRESCRIPTIONS INVOLVING PRISMS.

BY CHAS. F. PRENTICE, NEW YORK.

It is intended here to point out some instances in which lenticular decentration may be taken advantage of in the execution of prescriptions involving a combination of prisms with spherical and cylindrical lenses, in a manner to insure absolute accuracy, with least inconvenience of measurement and minimum expense of production. Within the past few years the practical value of the prism-diopter, as a unit (1△)[1] of prismatic power, has been appreciated to such an extent that the American Optical Company of Southbridge, Mass., and the Bausch & Lomb Optical Company, of Rochester, N. Y., have entirely discarded the old system of numbering prisms, in degrees, having now supplanted it by the prism-diopter for their entire "output." The prism-diopter is therefore no longer a subject for theoretical discussion, but one for practical consideration, having been indorsed in its underlying principle by both the

[1]Concerning this exponent (△) see papers by Dr. Swan M. Burnett in Annals of Ophthalmology and Otology, July, 1894, Transactions International Ophthalmological Congress, Edinburgh, 1894, and the Retractionist, December, 1894.

American Ophthalmological Society and American Medical Association, and two of the most progressive and largest manufacturing establishments in the world. It may be of interest to note that the gross productions of these firms amounted to over $2,000,000 in 1892. Such practical support certainly portends an enduring future of the prism-diopter, about which so much *pro and con* has been written since its first appearance in ophthalmic literature.[2] In this paper it will be taken for granted that the reader is at least familiar with the principles of the prism-diopter, so that only the relation which exists between it and the lens-diopter will here be repeated, to-wit:

A LENS WHICH IS DECENTERED ONE CENTIMETER WILL PRODUCE AS MANY PRISM-DIOPTERS AS THE LENS HAS DIOPTERS OF REFRACTION.

A knowledge of this law will frequently enable the oculist to change the form of his prescription so that it may safely be entrusted for execution to any optician capable of locating the optical center of a lens, and who is provided with no other instrument of measure than a pocket centimeter scale.

As the optician, generally speaking, is not allowed to exercise his own judgment in transforming prescriptions, it is necessary that the oculist's instructions be explicit respecting the proper method of putting his prescription into the best practical form. A few examples will serve to illustrate the method of applying the law of decentration.

PRESCRIPTION NO. 1.

O. D. + 3 D. sph. ⌒ 1 △ base out.
O. S. + 3 D. sph. ⌒ 1 △ base out.

The usual practice would be to grind + 3 sph. upon a prism of 1 △, so that a plano convex element of 3 D. is substi-

[2] A Metric System of Numbering and Measuring Prisms by Chas. F. Prentice, Archives of Ophthalmology, 1890 and 1891, AMERICAN JOURNAL OF OPHTHALMOLOGY, 1891.

tuted for the bi-convex lens used in the trial frame. In another paper, about to be published in the *Ophthalmic Record*, attention is called to the disadvantages of this procedure, where high degrees of curvature are concerned.

In the above example the ordinary method is objectionable, chiefly on account of the increased cost. The prescription shows that the prism-diopters required are few compared to the lens-diopters, so that the law of decentration becomes available. In accordance with this law, 3 D. sph decentered 1 cm. gives 3△, and since only 1△ is needed, a decentration of $^1/_3$ cm. for each lens will satisfy the requirements. To avoid unnecessary expense, the prescription should therefore be written:

O. U. + 3 D. sph. decentered $^1/_3$ cm. toward the temples, by which we mean that the thick edge of each lens should be placed at the temples, as in Fig. 1.

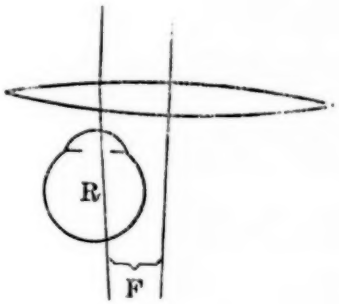

FIG. 1.

The dispensing optician's ability to apply the law of decentration is hampered only by one obstacle at present, namely, by the limited size of the lenses now furnished by the manufacturers.

These lenses, as they are usually supplied to the trade, are capable of a decentration of only $^1/_3$ cm. laterally, and $^1/_2$ cm. vertically. But even under these circumstances there are many prescriptions in which decentration may be profitably utilized. For instance:

PRESCRIPTION NO. 2.

O. D. — 2 cyl. 180 ⌒ 2△ base up.
O. S. — 2 cyl. 180.
Might be written:
O. D. — 2 cyl. 180 decentered $^1/_2$ cm. down.
O. S. — 2 cyl. 180 decentered $^1/_2$ cm. up.

The decentration of $^1/_2$ cm. on a 2 D. cyl. produces 1△, so that 1△ base up on the right eye, and 1△ base down on the left is equivalent to 2△ base up on the right alone. The term "decentration" signifies a displacement of the lens-center—relatively to the visual axis; hence, a decentration of $^1/_2$ cm. "down" on the part of the axis of the cylinder means that the axis is displaced downward, thereby placing the thick edge of the lens up, as in Fig. 2.

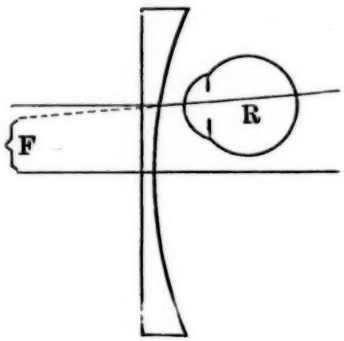

FIG. 2.

As another example let us cite a case in which the examination results in

PRESCRIPTION NO. 3.

O. D. + 4 D. sph. ⌒ 2△ base out.
O. S. + 2.75 D. sph. ⌒ + 1.25 cyl. 180 ⌒ 2△ base up.

In this instance the lens of the right eye would require to

be decentered $^1/_2$ cm. "out" to secure 2△, since 4 D. decentered 1 cm. gives 4△. We know, however, that $^1/_2$ cm. decentration is in excess of the $^1/_3$ cm. which is the limit of the ordinary lens laterally.

But, if we turn our attention to the left lens we see that it is possible to call upon the 2.75 spherical to supply a part of the lateral prismatic action, as the necessary displacement can be made along the cylinder's axis without implicating the cylinder. In other words, there are 6.75 D. of spherical power before the two eyes which may be called into requisition to provide an equivalent to 2△ base out for one eye.

The 6.75 D. decentered 1 cm. gives 6.75△, or decentered 1 millimeter = $^1/_{10}$ of 6.75 = 0.675△. As 2△ are needed, it it will take $3 \times 0.675 = 2.025$△, that is to say: a decentration of 3 millimeters on the part of each lens toward the temples.

The left eye calls for 2△ base up. We have vertically 2.75 sph. + 1.25 cyl. 180, equivalent to 4 D. of refraction, and capable of producing 2△ by a vertical decentration of $^1/_2$ cm. = 5 millimeters. The prescription should therefore read:

O. D. + 4 D. sph. decentered 3 millimeters out.
O. S. + 2.75 D. sph. ⌒ + 1.25 180 decentered 3 millimeters out and 5 millimeters up.

These examples suffice to show how easily and correctly these prescriptions may be executed without incurring the additional expense of grinding prismatic surfaces. This expense should only be incurred in those cases where decentration is impossible on account of insufficient size of the lenses. A glance at the prescription will determine at once which of the methods to apply. Take, for example a case like

PRESCRIPTION NO. 4.

O. D. + 1 sph. ⌒ 1△ base out.
O. S. + 1 cyl. 90° ⌒ 1△ base out.

As our commercial lenses are too small to bear a decen-

tration of 1 cm., it would be necessary to grind the lenses as the prescription is written, though even in the above case, to lessen the expense of the left lens, it is preferable to write:

O. D. + 1 sph. ⌒ 2Δ base out.
O. S. + 1 cyl. 90°.

In this event care should be taken to match the lenses as nearly as possible in thickness.

It would be a great convenience to have the optical companies manufacture a series of lenses capable of a decentration of at least 1 cm. Such lenses would not require to be larger than 6 cm. in diameter, and could be confined to the weaker powers, say from 0.25 to 2 diopters. The cost of such lenses would certainly not be greater than that of sphero-prisms, and would offer many opportunities of applying the prism-diopter expeditiously, with greater accuracy and less inconvenience to the dispensing optician.

TRANSLATION.

ON THE HEMIANOPIC REACTION OF THE PUPIL.

BY DR. S. E. HENSCHEN, UPSALA.

From Clinical and Anatomical Contributions to the Pathology of the Brain.

[Part III., Pages 100 to 115.]

In 1881 Wilbrand demonstrated from clinical experiences, that in cases of lesion of the optic tract, the pupillary reflexes and the perception of light must correspond.

From theoretical reasoning Wernicke,[1] in 1883 formulated the opinion, that the pupillary reaction must be a different one when, in a case of lesion of the optic tract, the right or the left half of the retina is stimulated in front of the point where the pupillary fibres, on their way to their centre, leave the course of the optic fibres. Wernicke located this centre in the corpora quadrigemina. He says, "centripetally each optic tract is connected with a reflex centre in the corpora quadrigemina. A hemianopic pupillary reaction results, when one tractus is transversally severed or its conductive faculty is destroyed."

This locally diagnostic reaction was soon acknowledged by different authors, as Mauthner (1885), Moebius (1886) and Philipsen (1886); but, it seems, that none of them had reported cases in proof. According to Wernicke, the hemianopic pupil-

[1] S. Wernicke, Gesammelte Aufsætze, 1893, p. 211, 325, Anm. 48.

lary reaction is not alone a theoretically formed symptom, but proven by a great many analogous observations. He relates, himself, that in a case of lesion of the chiasm, viz.: bitemporal hemianopsia, he has seen such a pupillary reaction. However, I have not succeeded in finding the description of this case in the literature. The practical value of this new symptom was, at a later date only,demonstrated by exact clinical observations.

The clinical observation of the hemianopic pupillary reaction is difficult. Samelsohn stated, that it was sufficient to illuminate the fundus with a common candle in order to produce the reaction. However, generally, I did not succeed as easily as that, in producing it. Formerly I threw, in a dark room, a light-cone concentrated by a convex lens by means of the ophthalmoscope into the eye which was turned outward or inward, taking especial care, not to strike the macula lutea with the light. During the last years, I use a lamp especially conducted for this purpose. The light is surrounded by a tin-tube in order to exclude all the light-stimulus and the light-cone can emerge solely through a hole in a diaphragm; it is then concentrated by a convex lens. With such a lamp it is easy to give the light-cone the desired direction.

Yet, even under these circumstances it is sometimes difficult to ascertain whether the reaction varies in strength, when light is thrown into the eye from different sides. When the pupillary reaction is weak from other sources (as in old people, in cataract cases) the difficulty increases in judging whether there is a hemianopic reaction or not.

[Here follow the clinical observations in 36 cases, giving partly positive, partly negative results; in 8 of these the brain lesion was located behind or laterally from the external corpus geniculatum; in 9 cases it was situated in the central ganglia; in 10 cases it concerned the optic tract; in 7 cases the chiasms and in 1 ccse the optic nerve was the seat of the lesion. Having, further, considered these cases pathologically and having

sifted them with regard to the question at issue, the following is the summing up of the clinical results:]

I. H. R. (hemianopic reaction) does not result:
   (*a*) In malacia of the occipital, parietal and temporal lobes;
      (1) Even, if the lesions are large, or if
      (2) The lesion has nearly reached the neighborhood of the corpus geniculatum.
   (*b*) In tumors in the region named,
      (1) Even, if they are large, or
      (2) Have destroyed the optic fibre radiation or have exerted slight pressure on
      (3) the pulvinar, or
      (4) the corpora quadrigemina from behind.

II. (*a*) When a tumor has reached the immediate vicinity of the frontal optic fibre course, the H. R. may not be plain, or incomplete, even if the course of of these fibres has not been interrupted.
   (*b*) A large tumor may (exceptionally?) from the fossa Sylvii press so strongly against the tractus, that H. R. results, if, at the same time, the intracranial pressure is considerably increased.

III. H. R. results, as a rule, in lesions of the tract, even, if they are very small.

IV. Lesions of the external corpus geniculatum do not seem to produce H. R., as, for instance,
   (*a*) when it is inflamed, or
   (*b*) the seat of a gumma or another form of tumor, or
   (*c*) of malacia.

V. Whether a lesion of the internal corpus geniculatum can cause H. R. is not known.

VI. H. R. does not seem to result from destruction of the pulvinar, neither
   (*a*) in malacia, or scar-formation, nor
   (*b*) when a slight pressure is exerted upon the ganglion.

VII. H. R. does not follow the destruction of the posterior corpora quadrigemina.

VIII. H. R. results from

(*a*) extensive tumor-infiltration of the posterior part of the tractus and pulvinar (pressure on the tractus?), and from

(*b*) extensive destruction of this region (consequent upon destruction of the brachium anterius ?).

IX. H. R. results from affections of the chiasm (especially syphilis) with bitemporal hemianopsia; often, however, it is lacking from unknown causes (as in tumor of the hypophysis ? or syphilis [Uhthoff's experiences]).

X. H. R. may be found in cases of fracture in the neighborhood of the foramen orbitale with monocular hemianopsia.

We now leave the clinical part of the question to treat of the anatomical one.

The question of the course of the centripetal pupillary fibres is of interest in a theoretical as well as in a practical direction. Only, when we know the anatomical course of these fibres, will we be able to appreciate the diagnostic value of the pupillary changes in a special case.

The dogma of the hemianopic pupillary reaction starts from the supposition that there are separate fibres for pupillary reflexes, and that these fibres behave in the chiasma like the other nerve fibres concerning their decussation, that, therefore, they also show a partial decussation, and that after the decussation their course coincides in the tractus with that of the other optic nerve fibres. Such a condition, furthermore, seems *a priori*, the most probable and the very existence of a hemianopic pupillary reaction is in the highest degree apt to affirm such an opinion. The anatomical proof, however, seems still to be wanting. As far as I know, nobody has as yet succeeded in isolating anatomically the centripetal pupillary fibres from the others or to follow up the course in the anterior optic portion.

Moreover, I hardly think that this problem could be solved by means of the anatomical examination alone, even if prominent anatomists should take up this research. It is probably superfluous, here, to relate the historical development of the question concerning the course of these fibres. I will only mention, that, according to Meynert, the radiating fibres which from the nuclei of the anterior corpora quadrigemina penetrate into the gray matter of the aquæduct, conduct the reflexes from the optic nerve fibres, which enter the corpora quadrigemina, to the nuclei of the oculomotor nerve.

Forel denies the existence of such fibres as well as their function as supposed by Meynert.

In a purely anatomical manner we have hardly progressed any further than Meynert. That is, we can prove that fibres from the optic tract enter the anterior corpora quadrigemina; and Ramon y Cayal has shown, that these supposed optic nerve fibres end here, shaped like little trees; yet, anatomy alone cannot furnish the proof that these fibres are the conductors of the pupillary reflexes.

By experiments only and by clinical-anatomical research, may we succeed. Different investigators have worked at this problem. Especially Gudden, Bechterew and Darkschewitsch have tried to solve it experimentally and have reached differing results.

By removing portions of the brain, in rabbits, Gudden came to the following conclusions: When one colliculus anterior corporis quadrigemini is removed, say the right one, the opposite eye of the animal is blinded. The left eye has no vision, the pupils, however, act normal in both eyes. When both anterior colliculi are removed, the animal is blind, but the pupils react normally. When, however, together with the anterior right colliculus a piece of the thalamus, lying in front of it, is removed, there results besides the leftsided blindness, an excessive dilatation of the pupil of the blind eye. In both cases a diffuse, but incomplete atrophy results in the left optic nerve. "There are, therefore, two centres in existence, each one with a separate system of fibres, a visual centre (anterior

colliculus) and one lying in front of it, by which reflexly the contraction of the pupil is governed." A third centre lies in the outer corpus geniculatum.

Darkschewitsch reached very similar conclusions. According to him, the pupillary fibres follow the tractus, leave it in the region of the external corpus geniculatum, and run through the thalamus opticus to the hypophysis and to the ganglion habenulæ, and from there the reflexes are conducted to the nuclei of the oculomotor nerves by means of fibres of the posterior commissure. * * *

This opinion, that the pupillary fibres run through the thalamus, seems to be participated in by Bellonci, who made extensive comparative anatomical researches.

Mendel, also, joins Darkschewitsch in so far that he sees a pupillary ganglion in the ganglion habenulæ. Having removed the iris in newly-born animals, he found atrophy of the ganglion habenulæ and of certain fibres of the posterior commissure. The reflex course of the centripetal pupillary fibres is then according to Mendel: Opticus, chiasma, tractus opticus, without crossing to the ganglion habenulæ, commissura posterior to Gudden's nucleus and to the oculomotorius.

According to Bechterew the centripetal pupillary fibres take a different course.

His experiments lead him to the opinion that these fibres run in the optic nerve only to the chiasm, that, however, further on they do not follow the tractus or penetrate into the corpora geniculata, but enter behind the chiasm, immediately and without crossing, into the gray matter of the third ventricle, from where they reach the oculomoterius. In this course they do not cross. There is no centre in the floor of the third ventricle but only a part of the centripetal course of the reflex arc; the centre itself lies in the nucleus of the oculomotorius.

These results were gathered from experiments on dogs. One optic tract being cut, hemianopsia resulted, but no change in the width and motility of the pupils. Also, after the anterior colliculi of the corpora quadrigemina had been destroyed

and after lesion of the lateral corpus geniculatum, the reaction of the pupil to light did not cease in dogs.

However, as Heddaeus remarked and every clinician knows, who has observed the hemianopic pupillary reflex, this conclusion is premature, since, in consequence of the partial decussation of the pupillary fibres in the chiasma, even after destruction of one tractus, an alteration in the pupi s is lacking on account of the action of the light-stimulus on the other half of the retina and on the macula lutea, the nerve supply of which is bilateral. As Heddaeus states correctly, such an alteration could only result when both tracts have been destroyed. * * *

* * * Christiani, also, has demonstrated a relation between the wall of the third ventricle and the pupil. * * *

* * * As has been stated above a lesion in the occipital course of the optic fibres never produces the hemianopic pupillary reflex, unless the lesion by its nearness influences noxiously the frontal course. From this we see, that the pupillary fibres do not lie in the occipital optic fibre course, they at some point deviate before the beginning of this course towards the middle line.

There can, on the other hand, remain no objection, that the pupillary fibres run in the tractus. Dryden's case and, still more, the one observed by me and examined microscopically, and in which I found a minute malacia in the anterior part of the tractus, opposite the frontal part of the pes, prove, that there are pupillary fibres in this locality. The pupillary fibres therefore, do not, as Bechterew thinks, deviate from the tract at the chiasma into the wall of the third ventricle, but do so later on.

This conclusion does not conflict with the other cases in which a hemianopic reaction was caused by a lesion of the tractus, nay, it is rather confirmed by them. * * *

* * * I now come to the question: Where do these pupillary fibres leave the tract in order to reach the thalamus? From what we stated above, we know that they follow the tractus at least to the frontal margin of the pedunculus cerebri;

but, do they enter the external corpus geniculatum, or not? According to Darkschewitsch and Bellonci the pupillary fibres leave the tractus in the region of the external corpus geniculatum. It would, however, be of interest if we could decide whether they do so within or in front of the corpus geniculatum externum. It is not impossible, that a finer local diagnosis could be made, if we could really demonstrate that the pupillary fibres deviate towards the median line in front of the corpus geniculatum.

In fact, I have observed a number of cases which support this opinion. In case No. 14 (which is described in extenso) an apoplexy was followed by permanent hemianopsia with word-blindness and rightsided hemiplegia. During his illness of several years, the patient had repeated epileptic attacks and with them the hemianopic pupillary reflex appeared very plainly, while it disappeared in the free intervals. This variation was observed several times, but shortly before his death no hemianopic pupillary reaction existed. Post-mortem, I found a well defined primary lesion in the left external corpus geniculatum.

A secondary atrophy of the tractus and both optic nerve was easily demonstrated.

Since, in spite of the destruction of the corpus geniculatum, the hemianopic pupillary reaction, was not constant, it seems justifiable to conclude, that the pupillary fibres do not run through the corpus geniculatum, but that they deviate in front of the ganglion towards the median line into the substances of the thalamus. The case is, however, not perfectly unobjectionable, because the corpus geniculatum was not perfectly destroyed and it might be, that the pupillary fibres passed through the intact part of the ganglion. * * *

* * * All these cases agree with each other, and if alone by itself not every one of them could be considered a sure proof, in their entirety they speak forcibly for the fact, that *the pupillary fibres do not enter the external corpus geniculatum.* * * *

* * * The pupillary fibres, therefore, probably deviate

towards the median line between the frontal margin of the pedunculus cerebri and the external corpus geniculatum. By means of the microscope, it is easily seen, that in this place no fibres deviate in a medial direction, except the medial root of the optic nerve and the very many fibres which traverse the most posterior part of the pedunculus to an extent of several millimetres. These fibres are very numerous. It is, therefore, indicated to look among them for the pupillary fibres. These fibres largely enter into the formation of the medial root. Some of them turn around the occipital margin of the pedunculus and then run along the medial margin of the pedunculus forwards toward the Luysian body. Their main body, however, divides into two fascicles, a lower one and a more superficial one. These encircle the inner corpus geniculatum or enter the ganglion. It is probable that here we have to look for the pupillary fibres. * * *

* * * The delicate question where the course of the pupillary fibres lies in the vicinity of the inner corpus geniculatum, can only be decided by repeated observations which combine clinical and anatomical research. The anatomical examination must be microscopical and concern especially the condition of the lower and the supercial fascicle of the medial root of the optic nerve. * * *

We have now traced the pupillary fibres to the medial margin of the inner corpus geniculatum; between this point and the pupillary nucleus in the gray of the aquæduct, lies only a short space.

Where do the pupillary fibres end? That is the last question.

I will here call to mind, that although we do not know as *a certainty* how they end, yet every analogy points to it, that the pupillary fibres have their ganglia in the retina and that they end with terminal ramifications in the usual manner. * *

* * * At present we seem to have final clinico-anatomical proof that the pupillary fibres end in the colliculus anterior, although this is in the highest degree probable. In analyzing my cases (described in this work) I have preliminarily

assumed this to be the case, however, I will *here particularly emphasize, that I do not as yet consider this opinion to rest on a scientific foundation.*

A few more words concerning the *radiary* fibres, found in the colliculus anterior. Several authors have declared them to be the pupillary fibres. I, therefore, wish to state, that these fibres are found, even where there is a total atrophy of the optic nerve. In my case 1, they were preserved; also, in case 7, in which a hemianopic pupillary reaction denoted the destruction of the pupillary fibres on the right side and a cyst severed the pulvinar from the colliculus anterior, they were easily visible. This proves that they do not atrophy with the pupillary fibres, but probably start from the cells of the white substance of the colliculus anterior and are connected with the fibres of the stratum lemnisci, which probably bring about the opticus-oculomotorius reflex.

With this question concerning the course of the pupillary fibres in the thalamus, is connected the question about the symptoms which would accompany a lesion in the portion of the pupillary fibres just treated on. As long as the lesion concerns the tractus, hemianopsia must, of course, result; if, however, the lesion strikes the pupillary fibres medially from the tractus (the medial root up to its end), it is clear, that a *hemianopic pupillary reaction* must result, but *without hemianopsia.* The fibres pass near the inner corpus geniculatum and since, in all probability, this ganglion is of a similar importance for hearing, as the external colliculus is for vision, such a lesion might be accompanied first by deafness, than by diminished hearing, in the opposite ear; that is, if the lesion happened to be leftsided the right ear would show diminished hearing.

Furthermore, there are the sensible fibres in the vicinity of the inner corpus geniculatum; a lesion concerning them means anæsthesia. If the lesion progresses further, hemiplegia may result.

As far as I know, such a lesion has not yet been clinically observed. Since lesions in this region are quite frequent, I

have for several years looked for such a case, but so far unsuccessfully.

The complex of symptoms just mentioned might be *pathognomonic for the region between pulvinar and thalamus*, and be of practical value, since it would speak against a surgical interference. * * *

* * * From the foregoing, it is clear that the hemianopic pupillary reaction is of importance not only theoretically, but also practically for a local diagnosis. However, only further researches can fully clear up the course of the pupillary fibres and thus demonstrate finally, the real value of the hemianopic pupillary reaction.

One more word concerning the local arrangement of the pupillary fibres in the frontal optic fibres. How are they arranged in the retina, optic nerve and tractus?

The observation, that a pupillary reflex can be obtained from any point of the retina, makes it probable, that the pupillary fibres are evenly distributed over the retina. * * * Concerning their arrangement in the optic nerve; the well-known researches of Key and Retzius teach, that the optic fibres in man differ in calibre. It is, therefore, also probable that they have different functions. There are two kinds of fibres which are intermingled. In 1882, Gudden has demonstrated two systems of fibres in the optic nerve, one of optic fibres and one which governs the reflex-action of the pupil. After destruction of the colliculus anterior (in rabbits) he found in the optic nerve of the opposite side "a considerable accumulation of the thick fibres," *i. e.*, atrophy of the thin fibres. This atrophy in the retina was a general, not a local one.

A case of Wilbrand's, communicated to me by letter, in which a hemianopsia following an injury of one optic nerve was accompanied by hemianopic pupillary reaction, seems to prove that the visual and the centripetal pupillary fibres for a certain portion of the retina, lie close together in the optic nerve.

Concerning the chiasma, we know only that the pupillary fibres undergo here, also, a partial decussation; the existence

of the hemianopic pupillary reaction proves that. * * *

* * * Where the pupillary fibres lie in the tractus, is at present perfectly unknown. * * *

* * * The only case, which, according to my knowledge, is likely to teach anything regarding the position of the pupillary fibres in the tractus is my case (No. 20), in which a microscopical atrophy in the dorso-medial edge of the right tractus caused in the left eye a well-marked, and in the right eye an imperfect hemianopic pupillary reaction. This case, therefore, points to it, that the pupillary fibres form a separate bundle at the dorso-medial edge of the tractus. Yet, this case is so far an isolated one.

SOCIETY PROCEEDINGS.

OPHTHALMOLOGICAL SOCIETY OF THE UNITED KINGDOM.

THURSDAY, NOVEMBER 8, 1894.

STEPHEN MACKENZIE, ESQ., M.D., Vice President, in the Chair.

LAMELLAR CATARACT AND RICKETS.

MR. TREACHER COLLINS read a paper on this subject. He pointed out how the opinion of Davidson and Horner, published in 1875, that lamellar cataract was the result of rickets, though widely accepted on the continent, was not even referred to in a large number of the text-books on eye disease in this country. He then read several comminucations from physicians and ophthalmic surgeons, collected for him by Dr. Barrett, of Melbourne, and Dr. Symonds, of Adelaide, as to the relative frequency of these two diseases in South Australia. The evidence thus obtained went to show that in Adelaide rickets is a very rare disease, and lamellar cataract very unusual. In Melbourne rickets was, until recently, comparatively rare; it is more common now, but the severity of the affection is much less than in the old world. Lamellar cataract is exceedingly rare, and the honey-combed condition of the enamel of the teeth is not often observed.

In Sydney, the oldest city in Australia, rickets is said to be as common as in England, but he had no information as to its comparative severity. Lamellar cataract is less frequent than in this country. In a recent visit he had paid to Persia,

Mr. Collins had endeavored to ascertain the amount of those two diseases there. He was assured by the medical men he met that rickets is uncommon; the conditions of life, moreover, are not such as are usually considered likely to favor its development. Amongst a very large number of eye patients whom he had seen in that country, there was only one case of lamellar cataract.

MR. MARCUS GUNN said it was still a moot point whether the condition of lamellar cataract was brought about by changes before or after birth. The decision of this point would have an important bearing on the question of association with rickets.

MR. JONES, who had spent twelve months as house surgeon, and three months as ophthalmic house surgeon in Australia, said that he had seen no case of lamellar cataract or of rickets there.

MR. SYDNEY STEPHENSON stated that he had examined all the new comers to one parochial school, in all about 5,000 children, and that among these he had only found four cases of lamellar cataract, the striæ being very delicate and easy to overlook. Rickets was very common, and its effects were readily discerned in children of five or six days.

MR. SILCOCK referred to the President whether both conditions might not be due to one common cause.

MR. POWER said that many lamellar cataracts were congenital, and belonged to a period antecedent to that at which rickets occurred.

MR. LANG contended that the changes in the lens involved the entire nucleus as well as the periphery, and that this as well as the development of the enamel, dated from before birth. He thought the whole change was ante-natal.

MR. MARSHALL though that the occurrence of fits, lamellar cataract and defective development of the enamel being in each case referable to abnormal change in the epiblast, was probably associated with some ante-natal defect in the central nervous system.

MR. LAWFORD, referred to the interference with the growth

of the enamel occurring after birth, quoted the domestic cat as being sometimes the subject of lamellar cataract. Similar changes in the lens of the rabbit, as observed by Bowmann, were quoted by Mr. Lang, and in the eye of the Australian bear, by Mr. Marcus Gunn.

THE PRESIDENT said that observers had not yet paid much attention to the association of lamellar cataract and rickets, and he was not sure how far such a connection was established. He knew of no common cause of this condition and changes in the enamel organ. It was difficult to say whether the opacities in the lens were developed, or only discovered after birth.

MR. TREACHER COLLINS, in reply, said that though most of the speakers appeared to dissent from the proposition involved in his paper, none had attempted to explain the absence of both conditions in Australia. Rickets was to a great extent an evanescent disease, and its traces could not always be expected to be recognized in the subjects of lamellar cataract. The mode of development of this latter condition was little known, as attention was only called to the lenses when the sight had become markedly defective. Calcification of the permanent teeth occurred about the time that rickets prevailed. He met the suggestions of cataract in the lower animals by quoting Mr. Bland Sutton's observations on rickets in males.

COMPLETE ANKYLO-BLEPHARON.

MR. KENETH CAMPBELL (Cairo) communicated a paper on this subject. The patient, a native of Upper Egypt, aged 50, presented himself with a large rounded tumor which completely masked the right orbit. There was no evident appearance of a palpebral fissure. The swelling was dull red and shiny, with some large veins on the surface, and measured laterally 4.8 cm., vertically 3.2 cm., and projected forward 3.2 cm. from the orbital margin; it was tense, fluctuating, and moved co-ordinately with the lid of the other eye. The man stated that the sight had been lost since childhood, and that the swelling had appeared before on more than one occasion, but had subsided

under poultices. A minute examination disclosed a trace of palpebral slit, without eye-lashes, at the extreme lower margin of the tumor, and the opinion was formed that the case was one of complete ankylo-blepharon with retained and probably semi-purulent lachrymal secretion. This was confirmed on the day preceding that fixed for operation by the perforation of the skin in the center of the upper eyelid, attended by escape of semi-purulent fluid and total collapse of the tumor. The palpebral slit was re-opened and the conjunctival sac dilated to obviate recurrence, but no attempt was made to re-establish the lachrymal channels owing to the great alteration of the parts by cicatrization.

NEW YORK ACADEMY OF MEDICINE.

Section of Ophthalmology and Otology.

October 15, 1894. Joseph A. Andrews, M.D., Chairman.

Blepharitis.

Dr. C. H. May presented a case of chronic blepharitis which was remarkable on account of the great hypertrophy of the margin of the upper lid of both sides. The right upper lid became affected, a year and a half ago. After the use of the yellow oxide of mercury ointment, it was very much improved and its size diminished from a thickness of half an inch to a quarter of an inch after six months. One year ago the left upper lid began in the same way, and although also treated with the yellow oxide of mercury ointment, it has not improved in any way; it now presents a tumefied margin fully half an inch in thickness, with an increase in the number and in the loss of lashes; the latter, when pulled out, showed that each hair follicle was surrounded by a considerable amount of pus.

Dr. H. Knapp suggested the use of nitrate of silver, two or three per cent., to the external surface, and one per cent. to the internal surface of the lid. There was no other discussion regarding the treatment of this case; the opinion was pretty general that operative interference was not advisable.

Reminiscences from a Visit to Several Ophthalmological and Otological Clinics of Europe.

Dr. Knapp.—I saw Wecker and Schweigger do strabismus operations. Wecker does the operation by dividing the tendon from the center to the periphery—the method which was original with Snellen, and published as long ago as 187[illegible].

Wecker makes a vertical incision of the conjunctiva, seizes the muscle, button-holes it, and cuts both upward and downward so as to divide the whole tendon, after which he unites the wound by a meridional suture. Schweigger passes a curved hook under the muscle, also making a vertical incision of the conjunctiva, and then, having loosened the lower border of the muscle, he passes a curved hook underneath it, and cuts first in the center and then up or down until the whole muscle is divided. He unites the conjunctiva with a vertical suture. The division of the tendon from the center to the sides is done to avoid any asymmetry in the contraction of the muscle when it has formed its new attachment.

I have seen both Wecker and Schweigger do advancements. The former makes a folding of the muscle in the manner that has been generally adopted. It is not only the capsule that is grasped and advanced, but the muscle itself. I find that two sutures often give an insufficient effect, and I have therefore added a third suture which passes through the center of the tendon. Schweigger's advancement is entirely different, and quite original. He measures the degree of strabismus linearly. He says the measurement by angles is of little value. In order to obtain equilibrium of the muscles afterward, he shortens the muscle exactly by the quantity of which the eye is displaced. This, he says, can only be measured linearly. He makes an incision through the conjunctiva, and then dissects the muscle from the conjunctiva. Having done this, and isolated the muscle, he passes a curved probe underneath it, freeing the tendon and muscle from the sclerotic on its inner surface. Then he passes another curved probe underneath the equatorial end of the exposed tendon, measures off the quantity by which he wants to shorten the muscle, introduces one end of a double-needle catgut thread through the equatorial end of the tendon from above, and then repeats this with another double-needle catgut thread from below, cuts the tendon between the probes and ties each catgut thread; then securing the end of the muscles, he passes the four needles through the stump of the tendon and adjacent episcleral tissue,

ties each pair of threads on the corneal side of the tendon, thus draws the muscle forward, and attaches it firmly to the insertion of the tendon. I will not say that it is better than other and more widely known methods, but it certainly answers the purpose very well. He then covers the field of operation by stitching the conjunctiva. He keeps the patient at the hospital for several days. The wound swells a little in every case, but he has never seen any bad results following it.

As to the indication for squint operations, I might say that there is still a great deal of uncertainty in Europe. In Edinburgh the idea was advanced that there should be much more advancement done than tenotomy. For the last nine years I have done a great many advancements with the object of restoring the elasticity of the muscle, but I have gradually returned to the simple tenotomy, and instead of curing squint on one eye, in the majority of cases I divide, as I formerly did, the operation between the two eyes. There is not the slightest doubt, I think, that in squint, the squinting muscle is considerably contractured. There is an increase of mobility, and the abnormal degree of this mobility is what we should reduce. We can do this without the least harm. If the antagonizing muscle is weak, then advancement is proper. When there is a high degree of strabismus, we get the better result by an advancement and a simple tenotomy. The result depends upon the individual case, and upon the manner in which the mobility is distributed among the different muscles. These statements are trite, but I repeat them because there were some very extreme notions promulgated at the Edinburgh Congress.

Now, I should like to speak of cataract. I have seen Panas and Schweigger make cataract operations. Neither of these operators are ambidextrous, and this makes them more or less awkward. For instance, Panas operates the right eye with the right hand, standing behind the patient, and the left eye also with the right hand, standing on the side of the patient, so that he has to cut upward. I saw him do an operation where the knife passed with difficulty, came out with a jerk, and the lens and vitreous came out also. When this ac-

cident occurred, he simply shut the eye up and did not look at it again. Schweigger operates on the right eye with a Graefe knife upward, and on the left eye with a Baer's knife downward. For my part, I prefer to make all extractions upward. Schweigger makes a number of preparatory operations. He simply divides the anterior capsule, and claims that this is the only efficient way. Five or six days afterward he extracts. This is the old Graefe method. McHardy, in the majority of cases, makes an iridectomy and trituration (Foerster's method). He also extracts soon afterward. I do not consider these procedures harmless; they certainly produce congestion and irritation, and, therefore, when the extraction is performed, the eye is not in so quiet a condition as it would have been if the preparatory operation had been omitted. Schweigger gets the cortex out by rubbing the cornea very freely. He does not do this with the eyelid, but with a rubber spoon.

Pannas operates on prolapse usually rather late. I saw him do two very interesting operations of this kind. The prolapse was very large, and had existed for three or four months He did the operation with his characteristic thoroughness. He cocainized the eye fully, then excised the protruding part of the iris, and afterward seizing it with forceps, cut out with scissors everything that lay in the wound. He not only cut out the iris, but also the pencils of connective tissue which penetrated the wound into the vitreous. This tissue was rather dense, and showed that connective tissue formed in such a wound just as it does in accidental injuries. I was rather struck with the boldness with which he operated on these cases. If I had such a large prolapse to operate upon, I certainly should not wait three or four months until these dense connective tissue bands had formed; it would be very much better, in my opinion, to cut the prolapse in the second or third week, before such dense bands had a chance to form. What prolapses can be cut? I think the small ones can be left to Nature, but the larger ones can be cut early—within a week or two, unless there be much inflammation present.

With regard to secondary cataract, I would say that Pa-

nas performs division in cases in which the capsule is thin. Secondary operations are not frequently performed in Europe; they do them principally where inflammatory products obstruct the pupil so as to seriously interfere with vision. In these cases they do either an iridectomy or an extraction of the secondary cataract. Panas says that extraction is the method for all cataracts—the hard and soft cataracts, and the secondary as well as the primary cataracts. As soon as there is hardened tissue in the capsule he considers it better to excise it. He thrusts a lance-shaped knife through the cornea, and pierces the secondary cataract with a forceps, one branch of which is pointed and the other blunt. He then pulls it out and cuts it. I saw him fail in one of these operations; he did not get the thickened capsule out. All forceps devised for this purpose are liable to fail.

In Paris I saw a new operation done by Kalt—stiching up the wound in a peculiar way after extraction. He had done it in fifty consecutive cases, with the object of preventing prolapse. I saw him do five of these operations. First he passes a silk thread through the upper part of the cornea, leaves a small piece of the limbus free, and passes the same thread through the adjacent episclera. The piece of thread lying over the free part of the cornea is drawn aside toward the nose. His section was as accurate as if it had been done by machinery. Having made the section, he completes the operation in the ordinary way. When the lens had been removed and the cleansing was completed, if the iris had not gone back to its proper position, he reduces it, and ties the knot so tight that the cornea wrinkled. He says no inflammation and suppuration follow this. The sutures are allowed to remain for four or five days, and are then removed without difficulty. The small passage of the needle through the upper part of the cornea, he says, leaves scarcely a perceptible trace. I examined several of his cases, and can testify regarding this point. He did not entirely prevent prolapse. In one case there was a large escape of the vitreous. He paid no attention to the vitreous; tied the suture in the ordinary way, and

afterward there was as good a closure as if no vitreous had escaped. This the operator explained by saying that the thread cuts the vitreous off. The operation is rather a complicated procedure, yet I have been quite favorably impressed by it.

I wish to speak about the Quinze-Vingts Hospital in Paris —for operative material, one of the largest eye hospitals in the world. The poor are treated and kept free. It is also a free asylum for the incurably blind. They have lately added a new wing for contagious eye diseases. Their method for treating blenorrhœic eyes is peculiar. Kalt uses as an irrigator the common Pulitzer ear speculum. The broad end of this speculum is placed between the two lids, and the small end is connected by rubber tubing with an elevated vessel containing the antiseptic solution. The rim of the speculum draws the lids away from the eye, and thus allows of very thorough irrigation of the conjunctival sac. The irrigation is done twice a day. There could be no question about the thoroughness of the cleansing process, but it seems to me to be rather rough treatment.

I saw a good deal of rhinological and laryngological work in Europe. Adenoid vegetations are mostly diagnosticated by means of the finger. At the Hospital Lariboisiere, in Gouguenheim's service, they use a modification of Loewenberg's forceps, by which they remove the pharyngeal tonsil easily by one or two introductions. They finish up with Hartmann's curette, which is not so liable to injure the Eustachian tube as is the Gottstein curette. I exhibit this forceps and Renault's tonsil ecraseur, which is excellent for removing fibrous palatal tonsils, covered with the arches of the palate. I find that in the majority of cases, mastoid operations in Europe had to be repeated.

The most important operation I saw while in Europe was done by William Macewen, of Glasgow, on a man about forty years of age, who had suffered for many years from otorrhœa. The mastoid showed the scar of a previous operation. The incision in the integument was close to the auricle, and about

two inches long. The bone was extensively laid bare and appeared normal. Sclerosis was diagnosticated, and verified by the operation. The whole operation was done by means of burrs rotated by a surgical engine, which was operated by hand power. The very dense bone was easily removed, and without splintering. The posterior osseous wall of the ear canal was removed down to the antrum. After having cleared the attic, the burr was applied to the posterior part of the sclerosed mastoid. From a small fistula, pus exuded, and this served as a guide. A shining patch of membranous tissue was finally exposed in a cavity which was evidently the posterior cranial fossa of the skull. This membrane seemed to be the inner wall of the lateral sinus. The case then was really one of extra-dural abscess. The ear canal and cavity of the mastoid were filled with a powder consisting of iodoform one part and boric acid three parts. A gauze and cotton dressing was applied, and confined with an elastic cotton roller bandage, which was not disturbed for about two weeks. I was particularly impressed with the value of the surgical burr in this operation.

Victor Horsley showed me a case of very great interest—that of a man with paralysis of the right arm, double optic neuritis, and a great diminution of sight. A large piece had been cut away from the parietal bone near the vertex, a tumor removed, and the bone replaced. Later on, the pressure symptoms returned, and it became necessary to remove the plate of bone, after which the symptoms were relieved.

DR. EMIL GRUENING.—I have seen Schweigger operate, in 1890, for advancement, and have been favorably impressed with the attempt made to secure mathematical accuracy. Another advantage is that there is considerably less swelling, and the third advantage is that it is not necessary to remove the sutures. Dr. Knapp has not referred to Panas' irrigation of the anterior chamber. I saw Trousseau operate at the Quinze-Vingts on six cases of cataract with nothing but a knife—no fixation forceps, no speculum, no cystitome.—*American Medico-Surgical Bulletin.*

SELECTIONS.

SCOPOLAMINE HYDROBROMATE.

BY ARTHUR G. HOBBS, M.D., ATLANTA, GA.

This new mydriatic is being tested now by some oculists, especially by those who are in charge of large clinics where it can be conveniently alternated with atropia, homatropia, etc., and the results compared. It seems at present to occupy a middle ground between atropia on the one hand, which is known to produce a complete paralysis of the accommodation and retain its effects for a week or ten days, and homatropia, which is claimed by some, and denied by others, to effect a complete control of the accommodative muscles and retain its effects only twenty-four hours. In the first case the time necessary to accomplish a full paralysis ranges from three to four days, and in the second only sixty to ninety minutes according to its advocates.

Scopolamine requires about tow hours, with intervals of twenty minutes between the instillations, according to my observations, to bring about the desired result, and so far as I have been able to decide by comparative tests, the full effect is then reached quite as completely as that produced by a three days use of atropia. Its paralysis lasts from two to three days, so it occupies a place between these two leading mydriatics, both in the time of reaching its maximum effect and in the time of its complete decline. The above comparison is based upon the assumption of the advocates of homatropia that this drug produces a complete relaxation of the accommodative muscles in one to one and a half hours, the truth of which I

am not yet fully prepared to accept. In the same proportion that atropia is used, in a one half to a one per cent solution (approximately two to five grains to the ounce), and homatropia in a one per cent. solution (about four to five grains to the ounce), so scopolamine is used as a rule, in solutions of two to five grains to the ounce, although I prefer it in weaker solutions. It should be dropped into the eye at intervals of twenty minutes until four instillations have been made; when it may be assumed that complete paralysis of the accommodative muscles has been reached.

It has served me thus far in such refractive tests that have required complete paralysis of the accommodation quite as well as atropia, and while it does its work much more quickly, its decline is at most about one-fifth and oftener one-sixth of the time required when atropia has been used. Homatropia will be the mydriatic, however, when we can become convinced that it effects a complete paralysis of the accommodation in one hour or even in twice that time, since there can be no question of its more rapid decline. Scopolamine produces no unpleasant effects in the throat, and it allows a possible accommodation within a day and a half or two days after its instillation, although the pupil may not become normal for a day or two longer.

Great comfort may be extended to the patient, particularly if he should be a business man with few hours to lose from his work, by prescribing a weak solution of eserine (one-eighth grain to the ounce) in order to more rapidly reduce the size of the pupil and indirectly aid the restoration of accommodation.

Some have asserted that scopolamine does not increase intraocular tension, but its use has not yet been sufficiently extensive to fully warrent this statement. Should this be true, scopolamine would possess a great advantage over atropia, especially in older subjects. In some phlyctenular forms of keratitis, as well as iritis, when occurring beyond middle age, it seems particularly efficacious: indeed I have already learned to place more confidence in it and feel safer when using it in

such cases. Although it is much less expensive now than when I first began its use, about two years ago, its cost still restricts its general use.

We may hope that the consensus of opinion will in a year or two furnish us with a more accurate knowledge of this drug, to indicate to us when and in what cases it is proferable to atropia or homatropia, in case it should ever reach this point of usefulness.

It is my opinion that it will in many cases supersede the first, and entirely supplant the last, unless homatropia should prove itself equal to the occasion now claimed for it by many. In this later case homatropia would supersede both atropia and scopolamine for refraction work, and leave a very narrow field of usefulness for the latter. Since the contingency still exists, however, we may continue to use scopolamine, particularly where we fear atropia, as well as in refraction work.—*Atlanta Medical ond Surgical Journal.*